Nutrient Composition of Retail Samples of Sorghum, Millet and Whole Wheat Flour

Susan E. Gebhardt and Robin G. Thomas, USDA-ARS Beltsville Human Nutrition Research Center

ABSTRACT
More than 2 million people in the United States have celiac disease, or about 1 in 133 individuals. People who have this disease cannot tolerate gluten, a protein in wheat, rye, and barley. The only treatment for celiac disease is a gluten-free diet. Nutrient profiles were lacking in the USDA National Nutrient Database for Standard Reference (SR) for sorghum and millet flour, both of which can be used in gluten-free diets. Three different brands of each type of flour were purchased from retail suppliers. Whole wheat flour samples were also obtained to update the existing nutrient profile. Samples were prepared at the Food Analysis Laboratory at Virginia Polytechnic Institute and State University and shipped by overnight delivery to analytical laboratories with appropriate analytical quality control and reference materials. These laboratories had previously been qualified to perform analyses of nutrients through the National Food and Nutrient Analysis Program. Samples were analyzed for proximate components, vitamins, minerals, and fatty acids. Whole wheat flour is higher in protein content at 12.2% versus 10.5% for millet, and 7.7% for sorghum flour. Millet is the highest in total fat content at 4.9% versus sorghum at 3.5% and wheat at 2.5%. Wheat flour is significantly higher (P <0.05) in calcium, iron, phosphorus, potassium, copper, and manganese compared to sorghum flour and significantly higher (P <0.01) in phosphorus, potassium, and manganese compared to millet flour. For health professionals who advise clients on food choices as well as for people who are trying to follow a gluten-free diet, having data for millet and sorghum flours in the SR provides an easily accessible and reliable source of nutrient information.

RESULTS AND DISCUSSION
One brand of each of the sampled millet and sorghum flours was identified on the label as "whole grain" and when contacted the other manufacturers stated that their products are whole grain. All three brands of wheat flour sampled claim whole grain on the label.

Proximates (See Figure 1)
- Carbohydrate: Sorghum has the highest carbohydrate level (77.22%).
- Total dietary fiber: Wheat (10.9%) has significantly more (P <0.05) fiber than millet (2.7%) and sorghum (5.2%).
- Protein: Millet and wheat have similar protein levels (10.75% and 13.21%, respectively) which are higher than sorghum’s 7.67%.
- Total lipid: Millet has the highest lipid level at 4.93%, with sorghum next at 3.45% and wheat lowest at 2.5%.

Minerals (See Table 1)
- Magnesium, sodium, and zinc are not significantly different among the three types of flour.
- Wheat is higher in calcium, manganese, phosphorus, and potassium content at 34.07, 363 mg/100g, respectively.
- Millet is highest in copper content at 0.54 mg/100g.

Fatty Acids (See Figure 3)
- The largest proportion of fatty acids in each flour is polyunsaturated.
- Millet and sorghum flours have a larger proportion of polyunsaturated fatty acids than wheat flour.

CONCLUSION
Nutrient content for proximate components, vitamins, minerals, and fatty acids in sorghum and millet flour will be included in SR23, and the nutrient values for whole wheat flour will be updated. This will provide an easily available source of nutrient information for sorghum and millet flours for people who are trying to follow a gluten-free diet as well as the general public.

REFERENCES